

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
SALINITY AND SODIC SOIL MANAGEMENT
 (Acre)

CODE 610

DEFINITION

Management of land, water and plants to control and minimize accumulations of salts and or sodium on the soil surface and in the crop rooting zone

PURPOSE

- To reduce and control harmful salt concentrations in the root zone
- To reduce problems of crusting, permeability or soil structure on sodium affected soils
- To promote desired plant growth and to utilize excess water in the root zone in non-irrigated saline seep areas and their recharge areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where the concentration or toxicity of salts limits the growth of desirable plants, or where excess sodium causes crusting and permeability problems.

This practice also applies to non-irrigated land where a combination of factors such as topography, soils, geology, precipitation, vegetation, land use and cultural/structural practices can increase the extent and concentration of salts in saline seep areas.

CRITERIA

General Criteria Applicable to All Purposes

All work including associated practices for management of irrigation, drainage and runoff shall comply with all applicable Federal, State and local laws and regulations.

As applicable, base the type and rate of application of soil amendments on a chemical analysis of the soil and irrigation water regarding concentrations and types of salts and or sodium, sodium adsorption ratio (SAR), exchangeable sodium percentage (ESP) and pH.

Refer to the Nutrient Management 590, Conservation Practice Standard for additional planning requirements for amendment applications.

Improve surface and subsurface drainage as practicable to decrease localized ponding and or high water tables.

Additional Criteria to Reduce and Control Harmful Salt Concentrations in the Root Zone

For irrigated land, determine the appropriate leaching fraction according to the procedures identified in the National Engineering Handbook Part 623, Chapter 2. Refer to the Colorado Irrigation Water Management 449, Conservation Practice Standard for additional planning requirements.

For non-irrigated land, utilize vegetation, soil amendments and or enhanced drainage, as applicable, to effect a decrease in soil salinity.

Additional Criteria to Reduce Problems of Crusting, Permeability or Soil Structure on Sodium Affected Soils.

Apply recommended soil amendments such as gypsum that contain soluble calcium, or sulfuric acid that will cause calcium in the soil to become available to react with sodium.

For irrigated sites, develop an appropriate leaching fraction according to the additional criteria listed above.

Deep tillage or plowing to a depth of 18 inches or more may also be required to invert or mix surface soil salt accumulations.

Additional Criteria to Promote Desired Plant Growth and to Utilize Excess Water in the Root Zone In Non-Irrigated Saline Seep Areas and Their Recharge Areas

Select appropriate plant materials for recharge and seep areas according to Colorado Plant Materials Technical Note No. 59, Plant Suitability and Seeding Rates for Conservation Plantings in Colorado.

Recharge Areas

Delineate recharge areas in the management plan.

Plant and/or maintain adapted high water use vegetation to utilize excess soil water, minimize infiltration and decrease subsurface soil water movement to saline seep areas.

Where practicable, divert run-on and/or install surface and/or subsurface drainage to minimize infiltration and decrease soil water in recharge areas.

Seep Areas

Delineate saline seep areas in the management plan.

Establish adapted vegetation in seep areas after water table elevations decrease sufficiently to prevent capillary movement of water and salts up into the root zone and to the soil surface.

CONSIDERATIONS

Monitor soil salinity levels to evaluate management practices and minimize the effects of salinity on crops. Tools such as electromagnetic induction meters (EMI) and salinity probes are appropriate for evaluating and for monitoring soil salinity levels.

Monitor soil sodium levels by collecting samples and submitting to soil testing labs to derive sodium adsorption ratio (SAR) and or exchangeable sodium percentage (ESP).

Soils with pH values greater than 8.6 indicate a possible sodium problem.

The drainage water from this practice may have high levels of salts. Select an outlet or disposal area that will minimize the effects of this saline water.

Removal of salts from the root zone by leaching operations may increase contamination of water tables. Avoid excessive leaching and schedule leaching operations during seasons when potential contaminants in the soil profile, such as nitrogen, are low.

Chiseling and sub soiling can improve permeability, root penetration and aeration where water movement is restricted by layered soils. Avoid inversion tillage that can bring salinity to the surface and interrupt the leaching process.

Green manure crops or applications of organic matter can improve soil structure and permeability.

Polyacrylamides may improve effectiveness of leaching and reclamation of some soils.

Water of slight to moderate salinity not dominated by sodium can enhance leaching of salts.

Residue management can improve the organic matter content of the soil, improve infiltration and minimize surface evaporation and capillary rise of salts to the soil surface.

Select and establish crops with a tolerance to the salinity/sodium levels present in the soil.

Consider using bedding and planting methods designed to reduce salinity near the plant root zone, especially for germinating seeds.

Eliminate fallow periods in recharge areas to increase utilization of soil water and to decrease infiltration.

Locate snow fences, windbreaks, vegetative filter strips and other structures that may accumulate rain and snow away from recharge areas.

Seal the bottoms of constructed ponds or dugouts to minimize subsurface soil water movement to saline seep areas.

Install underground outlets or surface waterways to drain storage terraces and minimize infiltration.

Plug leaky artesian wells if they contribute to subsurface water flows.

Roadways that cross natural drainage-ways can impede surface water flows and increase infiltration. Install or improve culverts to minimize blockage of surface water flows.

Plant cover or green manure crops in recharge areas to utilize excess soil water if the planned crop fails due to conditions such as poor stand establishment, hailstorms, winterkill, disease or insect damage.

Establishment of deep-rooted trees or shrubs in recharge areas can help utilize excess soil water.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for establishment and operation of this practice for each field or treatment unit according to the Criteria, Considerations and Operation and Maintenance sections of this standard.

Specifications shall describe the requirements for applying this standard to meet the stated purpose.

Record practice specifications on the Colorado Salinity and Sodic Soil Management 610, Conservation Practice Job Sheet.

OPERATION AND MAINTENANCE

Maintain all equipment for the proper placement and distribution of amendments and irrigation water.

Monitor the germination and growth of seedlings along with soil dispersal and crust formation to determine if toxic levels of salt or sodium remain. Develop a management strategy to reduce the reoccurrence of salt and/or sodium problems.

Identify any required items needed to assist in stand establishment such as mowing, flash grazing and/or herbicides to control weeds. Address insect and disease control needs where they are likely to create establishment problems.

Address any necessary replanting due to drought, insects or other uncontrollable events that prevented adequate stand establishment. Replanting activities may vary from complete re-establishment to overseeding or spot replanting.

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